TRMM Monthly Status Briefing

March 10, 1999

FOT Overview

- Key Issues to be discussed
  - FOT Staffing and project status
  - Risk Assessments and Reduction Analysis
  - Mission Life Evaluation
  - Solar Array Parking Status
  - CERES operational change status
  - Y2K conversion status
  - Subsystem Overview

FOT Overview

- Operations Status - Engineering Staff
  - Flight Ops Summary - Jeff Volosin
  - Training & Certification Status - Ave Kludze
  - Thermal & Electrical - Ave Kludze
  - ACS & RCS subsystems - Andy Calloway
  - Deployables - Joe Kowalski
  - FDS, C&DH, & RF - Ed Weidner
  - Power, LIS, VIRS, & CERES - Candace Shoemaker
  - PR & TMI - Joe Kowalski
  - Ground System & Y2K upgrade - Ed Weidner

Flight Operations Summary

- Staffing
  - Currently trying to replace console analyst that left in February
    - CSOC hiring restrictions have delayed this task
    - Effort underway at this time to bring on a new console analyst by early April
    - Current FOT members have volunteered to work extra shifts to cover for the vacancy until a good candidate is found
  - TRMM FOT FY99 Budget Has Not Yet Been 'Rolled Down'
    - Once budget and actuals are provided an additional console analyst may be brought on if funding is available to provide 'safety' margin
- CSOC/IMOC
  - Took part in preliminary meetings to discuss possible TRMM inclusion in the CSOC IMOC
  - IMOC SDR to be held at JSC next week
    - Decisions will be made on IMOC scope and initial mission set
- Risk Assessment
  - FOT performing a risk assessment focused on TRMM operations
    - Analysis will include MOC ground system, spacecraft, and MOC facilities
    - Prioritized results will be available by early April
- Overall Support in February
  - Supported 455 SN Events
  - All Available Science and Housekeeping Data Was Recovered

TRAINING

- The goal is to have all team members Certified as CC
  - including mission planners and engineers
- All Lead Analysts are completely certified
- Continuous Training Program:
  - Recertify Console Analysts annually
  - Train Console Analyst in critical areas
  - Train Console Analyst in new areas >> where new areas means changes to operations or configuration since launch
- Skills Checklist recently modified to :
  - reflect changes to operations
  - confirm and refresh analysts' knowledge of existing/new procedures

TRAINING

CONTINGENCY CHECKLIST:

- Developed Anomaly identification and recovery checklist for the following: - Safehold - Sun Acq - Low Power - GSACE Switch - Instrument Turn On
- PURPOSE:
  - To reduce Anomaly identification and recovery time
  - To provide a systematic approach to troubleshooting and recovery
  - Part of TRMM “Continuous Training Program”

SIMULATION:

- PURPOSE:
  - To keep Console Analyst abreast with developments and changes in operations
  - Make response to Anomalies quick and accurate
  - An opportunity for new Analysts to learn or witness uncommon spacecraft/ground system problems
  - Part of TRMM “Continuous Training Program” >> An effort to improve one of the best Analyst training programs within ATSC

Thermal Subsystem

- Operating nominally: all Temps were within limits
- Solar Beta angle cycle:
  - Biggest influence on thermal behaviors
  - Plots show Beta angle & complete range covered
- At Beta angle -58° Battery Temperature is lowest
  - Battery 1 Temp: between 5.8° and 6.7°
  - Battery 2 Temp: between 8.8° and 9.8°
- Location of boxes is a factor in temp. changes
- Future Projects:
  - Determing Thermal Cycle for whole year
  - Determing Thermal Cycle when heaters are ON
  - Use GenSAA to show locations of thermistors

Electrical Subsystem

- Electrical subsystem has performed nominally.
- Non essential bus current remains stable
- The Essensial bus voltage drops (to about 26.3 volts) after Delta-V has been performed in eclipse
  - Due to reaction wheel and age of power system
- Future Projects:
  - To investigate the long term impact of CERES power cyclingrelay on the subsystem >> No impact seen so far

ACS Subsystem

- TRMM flying +X forward as of 99-063
- Next Yaw Maneuver: March 26
- Next DeltaV Maneuver March 14
- ESA Interference Reports : GSOC update will make solar times more accurate
- ACS Report on ESA transient behavior now complete
- New FDC value of 16 minutes for ESA blockage being tested at STTF this week (FDCs remain disabled)

ACS Subsystem

- Open Issues
  - Yaw updates appear to be getting slightly larger
  - ACS researching ways to park solar array
  - With stuck array, torquer bar output may need to be increased to operate the mission
  - FDC changes for a parked array being researched by ACS
  - Yaw maneuvers would take slightly longer to complete

RCS Subsystem

- RCS has performed nominally through 83 Orbit Adjust maneuvers.
- Hydrazine Fuel Level
  - Initial: 890.039 kg Current: 752.418 kg
- Pressurant Pressure Level (9.6 kg initial)
  - Initial: 3346 psia Current: 2478 psia
- All Pressures below the regulator are well within the nominal 167.5 +/- 12.5 psia range
- RCS Operating Temperatures nominal
- All heater operations nominal
  - Trending validates that primary setpoints are accurate
- Outstanding Issues:
  - Maneuver Frequency Scenario: Consistent Pattern vs As Needed
  - Re-entry scenario - 50 kg vs uncontrolled

RCS Subsystem

- RCS Anomaly and Event Report Status
  - **AR 1: Catbed Temps YH in Sunacq - closed**
    - ISP Temps expected higher in Sunacq Mode
  - **AR 18: Thruster Off-modulations - closed**
    - Thruster misalignments now well documented
  - **AR 52: Aborted DeltaV - closed**
    - Wider body rates now established for maneuvers
  - **AR 57: Line 8 Temperature YH - closed**
    - These temps match orientation for -X forward at beta angle > -45 degrees
  - AR 64: Valve Temperature YH - closed
    - Limits are higher for post-maneuver temperatures due to soakback effect
  - ER 35: B-side Catbed Heater On - closed
    - RCCA written to prevent similar occurrence of not enabling DeltaV RTSs prior to maneuvers

RCS Subsystem

- Schatten Predix show 2000 as peak of 11 year cycle, decreasing starting in 2001
- Fuel usage calculations predict mission duration of 6.4 years, based on 98 Schatten predictions
- These calculations will be updated based on real 98 Schatten Index values and updated 99 prediction values

Deployables Subsystem

- All temperatures, currents, and voltages are within database limits
- Currently -Y solar array motor experiencing a temperature higher than life tests done for motor drive
  - Has come within 0.5° C of yellow high limit around beta angle 48°
  - Solar array stops currently at +/-50°
  - A 10° increase in temperature is 100 times more likely to evaporate the lubricant and potentially cause undetected metal particles
- Park -Y solar array before it fails
  - ACS and Power concerns will determine angle of parked array
    - +30° is currently being analyzed
  - Array parking scenario through ACS or GSACE control
  - Concern of Atomic oxygen and thermal effects on back of array

Deployables Subsystem

- Leave solar arrays limited so it fails in a favorable position
  - Favorable for sun acq and safehold if array stops at an angle of >30° (-50° to 30 is unfavorable)
- Finalize contingency plans for array if it fails tomorrow

FDS Subsystem

- Flywheel: half in lower 10 degrees of orbit
- EEPROM Burns
  - TSM
    - Table 21 (for CERES, 35-37, and Battery EOD SOC, 31-34)
  - RTS
    - Safehold/Low Power: 2, 3, and 13
    - If CERES changes are implemented; also 14, 15, and 34

C&DH Subsystem

- FS drift steady and linear: ~ -1μsec/hr/day
- Retries: ~ 1 retry/bus/day
- EDAC: 63 single/day, 1 double/2.5 days

RF Subsystem

- Drifting TCXO
  - XP1 ~ 600 Hz ahead and peaking
  - XP2 ~ 800 Hz behind and steady
- Strong Beta affect
- Offsets in AOS/LOS RTS?

Power Subsystem

- Temperatures, voltages and currents of overall system are nominal
- Power is nominal at the 24 A, VT 5, 1.03 C/D settings even with SA motion limited.
- Lowered charge settings due to Battery 2 Cell 1 anomaly. Stable 1.50 - 1.525 V.
- Since 98-172, 1.03 C/D not achieved on all orbits at Low Beta angles (<20°).
- During CERES tests and Delta-V maneuvers, the C/D is low < 1.03.
- Currently the SOC counters have not recovered from this weekend's activities (Yaw and Delta V maneuvers, CERES test).
  - Voltages, C/D are currently nominal.
  - Code 563 notified.

Power Subsystem

- Open issues:
  - Solar Array data for Code 563
  - Update charge settings for current scenario
  - Change charge settings for future solar array scenario
  - Update C/D trending to include SA data

LIS Instrument

- Voltages, temperatures nominal
- Perform Instrument Watchdog resets approximately once a month, to reduce packet sequence errors
- No open issues (other than Y2K test) to date

PR Instrument

- All temperatures, currents, and voltages are within limits
- No commanding done to PR except Internal and External Calibration sequences since the Sun Acq/GSACE anomaly
  - Continue to perform Internal Calibrations over Australia (as of 99-007)
    - ~2 per day
  - Three External Calibrations performed nominally in year of 1999
    - Total of 15 done since L&IOC
- Panel Temperatures have stayed well above heater setpoints
  - Operational/Survival heaters have not come on since the Sun Acq/GSACE anomaly

PR Instrument

- Open issues
  - Determining times when Survival heaters came on during last anomaly to aid Power in analysis of parking the -Y solar array
    - Expect to be completed in next week
  - TIL-1205: Get updated pointing accuracy values from FDF
  - Request for pitching TRMM 0.8° has been withdrawn

TMI Instrument

- All temperatures, currents, and voltages are within limits
- No instrument commanding done since power ON after the Sun Acq/GSACE anomaly on 99-003
- Open issues
  - Interference issue
    - Was any correlation found from the last Deep Space Calibration between the interference and PR
  - Does the need for a Deep Space Calibration for TMI outweigh any other risks to TRMM?

Ground System

- Multiple Hardware Failures
  - Including fan failures
- Front End 3 still experiencing Frame Overflows
- Occassional PTP reboots, but no loss of data

Y2K

- Upgraded String 1 running successfully as prime
- Testing of String 2 close to completion
  - Mission Planning
  - Remote Sites
- GTAS coming slowly
  - Lost jukebox, 18 days of stats to makeup
  - Root disk failing
  - Trying for HSS on server
- String 3 next
- Overall so far, system works but is slower